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TIMBER MANAGEMENT PLAN

ARAPAHO WORKING CIRCLE

July 1, 1961 - June 30, 1971

Arapaho National Forest

Colorado

R-2

REGION TWO

FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE

TIMBER MANAGEMENT PLAN

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July 1, 1961 - June 30, 1971

Arapaho National Forest

Colorado

R-2

Submitted By:

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Reviewed and Recommended for Approval:

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(D.J.M.)

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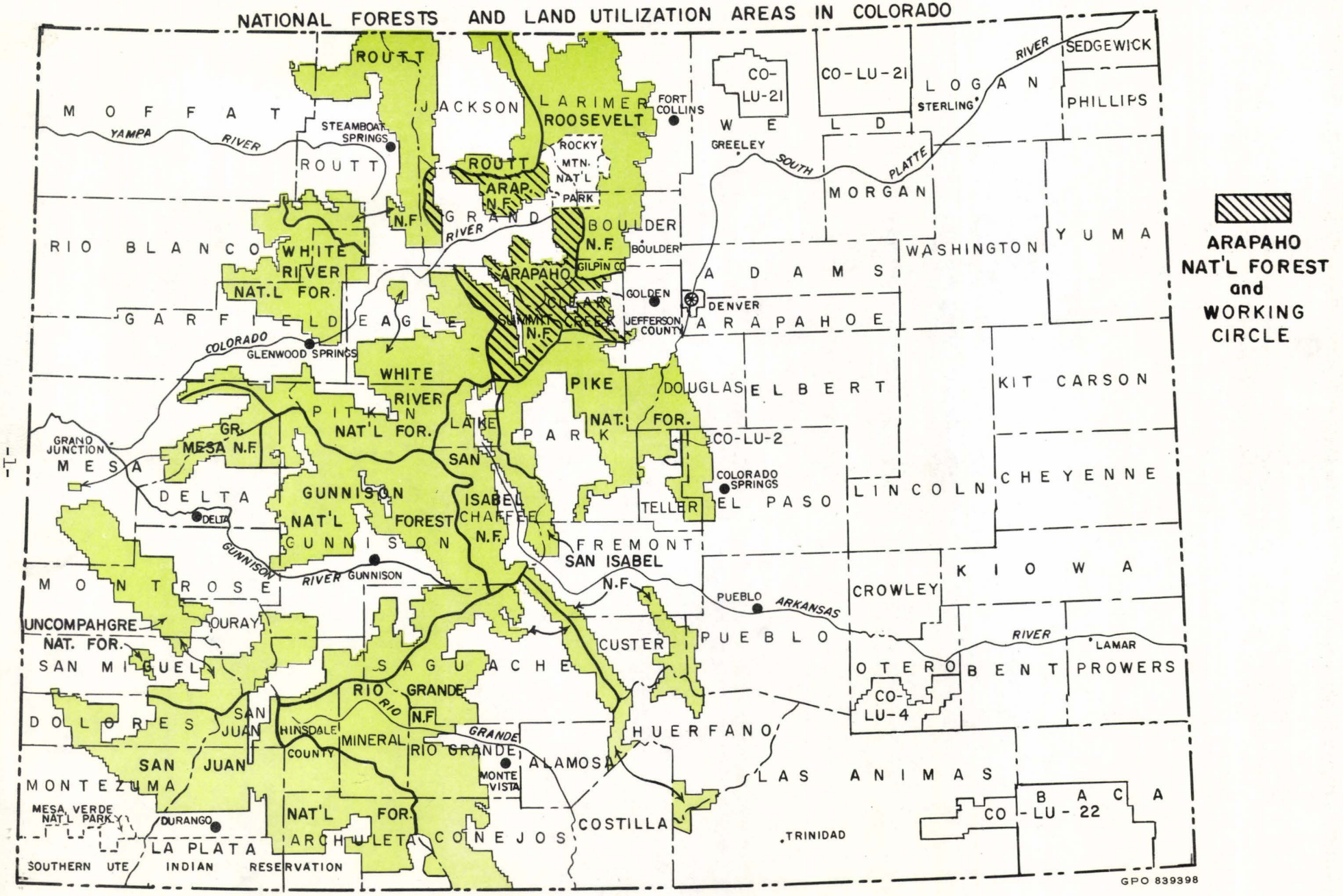

NATIONAL FORESTS AND LAND UTILIZATION AREAS IN COLORADO
ROUTT
JACKSON
LARIMER
ROOSEVELT
FORT COLLINS
CO-LU-21
CO-LU-21
SEDGEWICK
PHILLIPS
LOGAN
STERLING
RIVER
MOFFAT
YAMPA RIVER
STEAMBOAT SPRINGS
WELD
GREELEY
SOUTH PLATTE
ROUTT
ROCKY MTN. NAT'L PARK
ARAP. N.F.
MORGAN
N.F
GRAND
RIVER
BOULDER
N.F.
BOULDER
RIO BLANCO
WHITE RIVER NAT.L FOR.
ARAPAHO
GILPIN CO
WASHINGTON
YUMA
ADAMS
GOLDEN
DENVER
GARFIELD
EAGLE
SUMMIT
CREEK
N.F.
JEFFERSON COUNTY
ARAPAHOE
COLORADO
GLENWOOD SPRINGS
WHITE RIVER
PIKE
DOUGLAS
ELBERT
KIT CARSON
PITKIN
NAT'L FOR.
LAKE
PARK
NAT. FOR.
CO-LU-2
GRAND JUNCTION
GR. MESA N.F.
MESA
SAN
COLORADO SPRINGS
LINCOLN
CHEYENNE
DELTA
GUNNISON
NAT'L FOREST
ISABEL
CHAFFEE
N.F.
TELLER
EL PASO
DELTA
GUNNISON
GUNNISON
RIVER
FREMONT
SAN ISABEL
N.F.
MONTROSE
PUEBLO
ARKANSAS
CROWLEY
KIOWA
UNCOMPAHGRE
NAT. FOR.
OURAY
CUSTER
PUEBLO
RIVER
LAMAR
SAN MIGUEL
SAGUACHE
OTERO
BENT
PROWERS
RIO GRANDE
N.F.
CO-LU-4
DOLORES
SAN JUAN
HINSDALE
COUNTY
MINERAL
RIO GRANDE
HUERFANO
SAN JUAN
ALAMOSA
MONTE VISTA
LAS ANIMAS
MONTEZUMA
MESA VERDE NAT'L PARK
DURANGO
NAT'L FOR.
ARCHULETA
CONEJOS
COSTILLA
TRINIDAD
BACA
CO-LU-22
LA PLATA
SOUTHERN UTE INDIAN RESERVATION
ARAPAHO NAT'L FOREST and WORKING CIRCLE
GPO 839398

SUMMARY OF PLAN

Table 1

Annual Allowable Cut From Regulated Area

Type	Area Acres	Volume Cubic Feet MM C.F.	Volume Board Feet Scrib. Dec. C MM B.F.
Lodgepole Pine			
Sawtimber (LP9)	1,440	4.2	14.5
Poletimber (LP8)	3,170	4.6	--
Spruce-Fir			
Sawtimber (SF9)	1,150	3.6	14.0
Total	5,760	12.4	28.5

Volume By Species From the Regulated Area

Species	Sawtimber Types* Lodgepole Pine M B.F.	Sawtimber Types* Spruce-Fir M B.F.	Sawtimber Types* Total M B.F.	Poletimber Type Lodgepole Pine M C.F.
Lodgepole Pine	12,659	925	13,584	4,034
Engelmann Spruce	1,666	11,430	13,096	285
Subalpine Fir	161	1,506	1,667	166
Limber Pine	---	35	35	5
Douglas-fir	14	---	14	9
Aspen	---	104	104	101
Total	14,500	14,000	28,500	4,600

*Board Foot Volume based on Scribner Dec. C Log Rule.

Table 2

Total Volume in Unregulated Types

Type	Area Acres	Volume
Douglas-fir Sawtimber	2,591	15,519 M B.F.
Dead Spruce	3,999	17,295 M C.F.
Aspen Poletimber	32,121	37,154 M C.F.
Residual Volume in Lodgepole Pine Sawtimber Cutover Areas Trees 5.0-8.9	1,440 Acres per year	1,200 M C.F. per year

Table 3

Area Summary By Ownership, Land Classification and Stand Size Classes

Acres

Land Classification and Stand Size Class	National Forest	State	County and Municipal	Private	Total
Commercial Forest Land - Unreserved					
Large Sawtimber	1,129	--	--	10	1,139
Small Sawtimber	319,663	25	401	22,730	342,574
Poletimber	298,649	75	318	25,113	324,400
Seedling-Sapling	28,911	25	109	2,440	31,485
Nonstocked	16,068	--	40	989	17,097
Unclassified	3,999			60	4,059
Sub-Total	668,419	125	868	51,342	720,754
Reserved	38,354	50	--	--	38,639
Noncommercial	94,930	--	83	7,912	102,925
Non-Forest	191,249	70	235	20,201	211,520
Grand Total	992,952	245	1,186	79,455	1,073,838

Table 4

Area By Type, Stand Size and Stocking Class

Commercial National Forest Land — Arapaho Working Circle

Acres

Timber Types	Large Sawtimber				Small Sawtimber			
	Well	Medium	Poor	Total	Well	Medium	Poor	Total
Douglas-fir						696	1,895	2,591
Ponderosa Pine						125	1,435	1,560
Lodgepole Pine		40		40	483	72,162	56,216	128,861
Limber Pine, etc.						50	615	665
Spruce-fir		802	287	1,089	310	137,495	47,936	185,741
Sub-Total		842	287	1,129	793	210,528	108,097	319,418
Dead Spruce				--				--
Aspen				--				245
Total				1,129				319,663

Acres

Timber Types	Poletimber				Seedling-Sapling				Non-Stocked	Total Acres
	Well	Medium	Poor	Total	Well	Medium	Poor	Total		
Douglas-fir	1,710	490	77	2,277						4,868
Ponderosa Pine	50	1,150	635	1,835					60	3,455
Lodgepole Pine	85,966	102,660	30,524	219,150	13,283	3,242	1,593	18,118	1,122	367,291
Limber Pine, etc.	285	2,290	920	3,495		45	335	380	30	4,570
Spruce-fir	3,582	23,305	13,129	40,016	20	773	1,446	2,239	14,856	243,941
Sub-Total	91,593	129,895	45,285	266,773	13,303	4,060	3,374	20,737	16,068	624,125
Dead Spruce				--				--		3,999
Aspen				31,876				8,174		40,295
Total				298,649				28,911	16,068	668,419

Table 5

Total Volume for Commercial Forest Lands
By Ownership

Ownership	Total Volume		
	Trees 9.0" D.B.H. and Larger		Trees 5.0" D.B.H. and Larger
	Int. $\frac{1}{4}$" MM B.F.	Scribner Dec. C MM B.F.	MM C.F.
Softwood Types			
National Forest	4,310	3,574	1,360
State and County	5	4	2
Private	278	230	28
Total	4,593	3,808	1,390
Hardwood Types			
National Forest	--	--	41
State and County	--	--	--
Private	--	--	5
Total	--	--	46
Grand Total			
National Forest	4,310	3,574	1,401
State and County	5	4	2
Private	278	230	33
Total	4,593	3,808	1,436

Table 6

Summary of Total Area, Net Volume Per Acre and Total Volume By Species
For Major Sawtimber Types - National Forest Unreserved Lands
Scribner Dec. C Log Rule - Trees 9.0 Inches D.B.H. and Larger

Type	Area Acres	Volume Per Acre Bd.Ft.	Species								
			Douglas fir	Ponderosa Pine	Lodgepole Pine	Limber Pine	Sub-alpine Fir	Engelmann Spruce	Aspen	Total	Percent
			MM Bd. Ft.								
Douglas-fir	2,591	5,989	12		2		2			16	0.4
Ponderosa Pine	1,560	1,019		1						1	--
Lodgepole Pine	128,901	9,927	1		1,117		14	147		1,279	35.8
Small Sawtimber Spruce-Fir	186,830	12,176			150	6	245	1,857	17	2,275	63.8
Total	319,882	11,163	13	1	1,269	6	261	2,004	17	3,571	100.00
Percent			0.4	--	35.5	0.2	7.3	56.1	0.5		100.00

Table 7

Periodic Annual Net Growth Based on Past 10 Years
By Major Types and Kind of Volume

Type	Area	Volume per Acre			Total Annual Growth By Type		
		Inter. ¼-Inch	Scrib. Dec. C	Cubic Feet	Inter. ¼-Inch	Scrib. Dec. C	Cubic Feet
	Acres	B.F.	B.F.	C.F.	M B.F.	M B.F.	M C.F.
Lodgepole Pine							
Sawtimber	128,901	33.00	28.68	8.69	4,254	3,697	1,120
Poletimber	219,150			16.40			3,594
Spruce-Fir							
Sawtimber	186,830	44.11	38.64	8.34	8,241	7,219	1,558

Table 8

Recommended Rotation and Adjustment Period

Type	Adjustment Period	Rotation
	Years	Years
Lodgepole Pine	80	80
Spruce-Fir	100	140

Revision Date: June 30, 1972.

TIMBER MANAGEMENT PLAN
for the

ARAPAHO NATIONAL FOREST

INTRODUCTION

The Arapaho Working Circle timber management plan constitutes the 10-year action program for the working circle. The plan prescribes the action necessary to meet the long-term objectives in the General Timber Management Statement for the Arapaho National Forest.

This plan will be revised by June 30, 1971, and sooner if necessary to meet changing conditions.

Detailed Forest Survey data, from which this plan was formulated are found on the IBM sheets labeled "1957 Forest Survey, Colorado IBM Sheets, Arapaho National Forest, Sample Unit #20" and filed in the office of the forest supervisor at Golden, Colorado.

Atlas binders containing compartment records and maps with compartment descriptions including area and volume breakdown by types are kept in the rangers' offices. These records will be kept current for action taken within the compartments.

SUMMARY OF RESULTS UNDER PREVIOUS PLANS

The Arapaho Working Circle plan, as described in the General Timber Management Statement, consolidates the Clear Creek, Dillon, Fraser and Middle Park Working Circles into one. The last revision of the working circle plans was during the period 1947-1949. These plans established a total annual allowable cut for the forest of 21-1/2 million board feet.

During the period 1951-1960 the Arapaho Working Circle's actual cut was 89.4 percent of the allowable cut. The actual cut fell short because of the lack of timber access roads and demand for timber.

A comparison of the actual and allowable cut is shown in the graph on page 12.

Timber Stand Improvement and Reforestation Accomplishments

1. Artificial Regeneration

   a. Planting - Satisfactory survival has been obtained on 335 acres. Lodgepole pine was the principal species planted.

   b. Seeding - Direct seeding was used on 2,134 acres. Satisfactory survival was obtained on 1,026 acres.

   c. Artificial Measures to Obtain Natural Regeneration- Broadcast burning was done on 389 acres of cutover lodgepole pine type. Results indicate fill-in planting may be necessary to obtain full stocking.

      Approximately 110 acres were scarified and the slash machine-piled and burned in 1960.

Protection Accomplishments

1. Disease Control

   Control of dwarfmistletoe (Arceuthobium americanum, Nutt) in lodgepole pine has been accomplished on 2,110 acres.

2. Fire Control

   During the period 1951 to 1961 the Arapaho Forest had a total of 197 fires -- burning 1,766 acres. The three largest fires burned over 300 acres each. Each of the remainder was 10 acres or less in size. This is an average of 177 acres per year which is considerably less than the allowable burn of 578 acres per year.

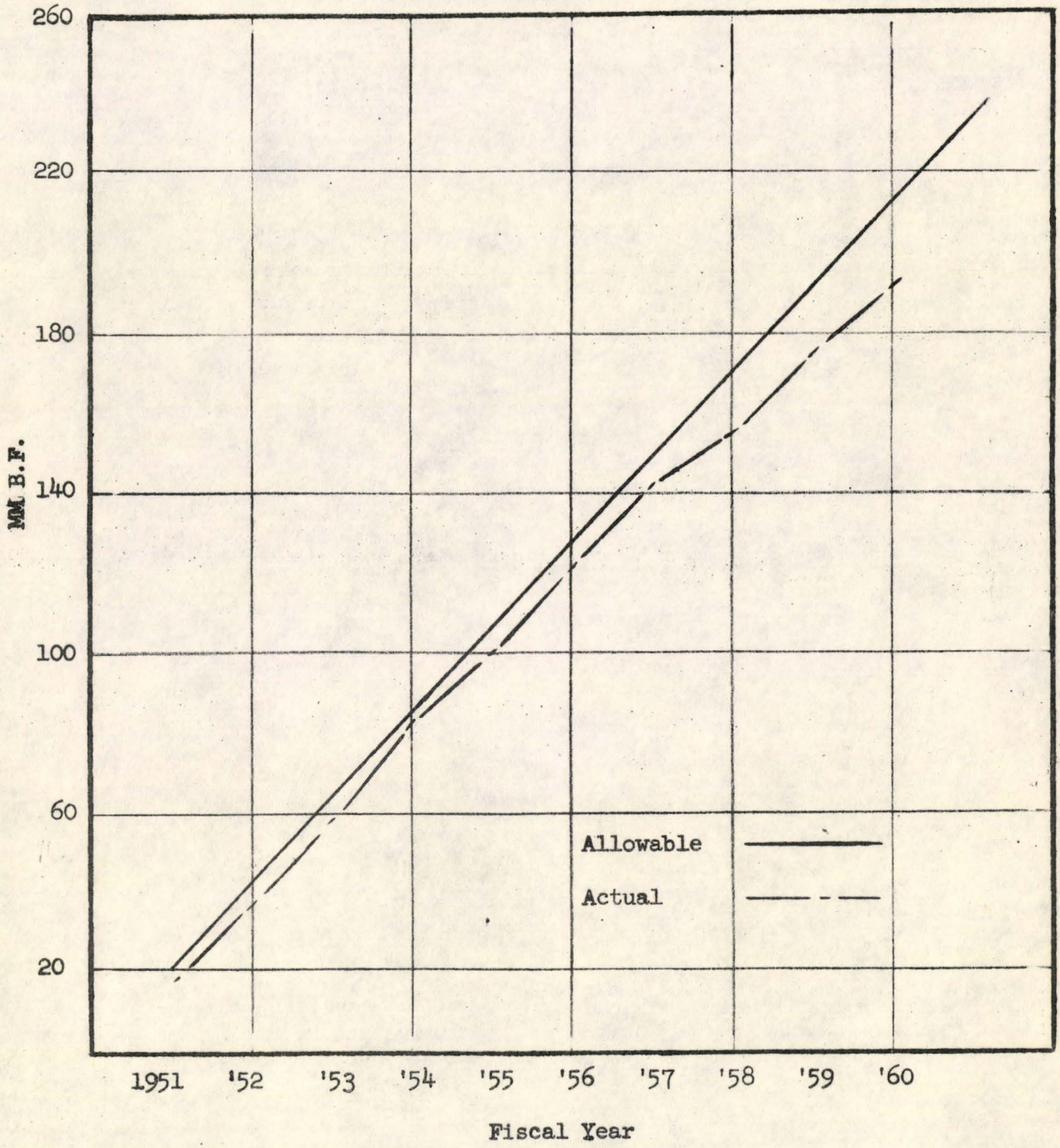
Area Put in Good Growing Condition

Approximately 20,000 acres have been put into good growing condition in the past 10 years. This has been done through regeneration cutting on timber sales and by timber stand improvement work.

COMPARISON OF CUMULATIVE TOTAL

ALLOWABLE CUT WITH ACTUAL CUT

F. Y. 1951 - 1960



MANAGEMENT OBJECTIVES

The objective of this plan is to set up a 10-year program that will enable the accomplishment of the long-range objectives as stated in the General Timber Management Statement by the year 2000 A.D.

In general the objectives for the next 10 years will be:

1. Work with adjacent forests toward the establishment of a pulp mill in the vicinity of Kremmling, Colorado, that will utilize largely lodgepole pine poletimber-size trees and associated sawtimber types.

2. Attain the total allowable cut for the working circle by F.Y. 1971. This means maintaining the current average annual cut of sawtimber and utilizing the remainder of the allowable cut in pulpwood operations.

3. Assure adequate stocking within three years after cutting on all current timber sale areas by using approved methods for ground preparation. Plant approximately 300 trees per acre on some 1000 acres of spruce-fir cutover area per year to assure the regeneration of the stand.

4. Make an on-the-ground examination of the 16,000 acres classed as nonstocked and set up a reforestation program to accomplish 50 percent of necessary planting during this period.

5. Examine the 40,000 acres of aspen type and prepare a reforestation plan. One-fourth of the prescribed planting job will be scheduled for accomplishment during this period.

6. Maintain proper stocking in the lodgepole pine type to assure an acceptable rate of growth.

7. Reduce infections of dwarfmistletoe in lodgepole pine by destroying the infected residual stands in accordance with standards in the Timber Management Guide FSH2-2442.8.

8. Prevent epidemic outbreaks of destructive forest insects.

9. Keep commercial forest land fire damage within PAR established in the fire plan -- 578 acres per year.

MULTIPLE-USE COORDINATION

Timber management activities within the aesthetic zones such as travel influence zones along U. S. Highways 6 and 40, water influence zones and recreation sites will be in accordance with the Eastern Colorado Subregion Land Management Plan for that part of the working circle on the eastern slope of the Rocky Mountains.

The Western Colorado Subregion Land Management Plan will be the guide for the remainder of the working circle.

The land management block plans for the area will be consulted for details at the time that presale prescriptions are prepared. Also, reference is made to FSM and FSH 2100, 2300 and FSH2-2442.8.

REGULATION

Regulation will be by area, with the allowable cut expressed in both area and volume. Control will be by 10-year periods. Undercuts that have built up during the period may be cut during the remainder of the same period, provided that the total cumulative cut does not exceed the allowable periodic cut by more than 10 percent. The control of the allowable cut will be by type area and not by species or products cut within the type. Sales programs will be by species and products and will be in volumes sufficient to meet area control objectives. Sales programs will normally exceed allowable cut objectives; otherwise the average annual cut will fall short of meeting the 10-year objective. Emphasis will be placed on increasing the current actual cut until experience shows the allowable cut objectives are assured.

The financed cut for any one year is based upon volume and includes the cut from both the regulated and unregulated areas. The financial cut quota should be sufficient to meet both volume and area objectives for the forest as a whole.

If the present relationship between area and volume is found to be out of proportion for the forest as a whole, the volume allowable cut will be adjusted to be consistent with area regulation. No adjustment, however, will be made prior to the end of the first five-year period.

The major sawtimber types are lodgepole pine and spruce-fir and both of these types will be regulated.

There is a good chance that a pulp mill will be established within the working circle during the next 10 years. This mill will use a large volume of lodgepole pine poletimber-size timber. Therefore, cutting in the lodgepole pine poletimber type will be regulated.

There is no foreseeable market for aspen during this planning period. Cutting in this type will not be regulated until markets are developed for the product.

Rotations

Previous plans used rotations of 160 years to calculate the allowable cut. This plan uses an 80-year adjustment period to convert wild lodgepole pine stands and 100 years to convert wild spruce-fir stands to managed stands.

Growth and mortality will be re-examined at 10-year intervals. If there is a material increase in mortality, the adjustment period will be subject to change.

In reality the 80 and 100-year adjustment periods are the equivalent of rotation periods. It is expected that a short rotation period for pulpwood or some similar product will be in order at the end of the adjustment period.

The following rotation periods are used in the Kemp formula as a comparison with the tabulation method of determining the allowable cut:

Lodgepole pine type	-- 80 years
Spruce-fir type	--140 years

Information will be collected so that rotation periods can be established for the working circle prior to the next revision. If a pulpwood industry is established at Kremmling, a pulpwood rotation will, no doubt, be established for the lodgepole pine. An 80-100-year rotation for lodgepole pine would provide a sustained yield capacity to more than take care of a pulpwood industry, plus the current lumber industry for the working circle.

Method of Cutting

Region Two's Management Guides for Lodgepole Pine, Engelmann Spruce and Associated Species, FSH2-2442.8, will be applied in timber marking. These management guides provide for clear cutting by patches or strips, with even-age management as the objective.

Growing Stock

The forest inventory divides the major timber types into stand size classes and stocking classes. The definitions for these classes are Forest Survey standards.

The standard tree size classes are:

Sawtimber	11.0 inches and larger D.B.H.
Poletimber	5.0 inches to 10.9 inches D.B.H.
Seedling-Sapling	1/2 foot high to 4.9 inches D.B.H.

Stocking class or crown density class refers to the extent to which growing space is utilized by present growing stock trees of commercial species. The classification is based on the percent of crown closure. The stocking classes for sawtimber stands, as used in this plan, are for the percent of closure of sawtimber crowns. The stocking classes for poletimber and seedling-sapling stands are based on crown closure for all trees, regardless of their size.

Classification	Percent of Crown Closure
Nonstocked	0 to 9
Poorly stocked	10 to 39
Medium stocked	40 to 69
Well stocked	70+

Condition classes were not used in the survey. The breakdown into stand size classes is purely on size and does not reflect the growing potential of the trees into the next larger size class. For example, considerable area of lodgepole pine that may never grow into sawtimber was typed out as poletimber. The trees are overcrowded and too old to put on additional growth. The lands supporting such overaged and stagnated stands can be put into growing condition only by removing the present stand and reforesting the area.

Table 10 summarizes the distribution of stand size classes for the two regulated major types. Since very little of the lodgepole pine poletimber size type is likely to grow to a larger stand size class, 95 percent of the lodgepole pine type is now ready for a harvest cut. For the spruce-fir type, 77 percent is ready for a harvest cut.

The operability factor was obtained by discounting the area to exclude the experimental forest, heavily used recreation areas, complex land ownership pattern, a fringe of unmerchantable timber at timber line, and poorly stocked steep rocky slopes.

Table 9

Distribution of Stand Size Classes
For Regulated Types

Stand Size Class	Lodgepole Pine Type			Spruce-Fir Type		
	M Acres	Percent of Type	Percent Operable	M Acres	Percent of Type	Percent Operable
Sawtimber	129	35.1	82	187	77	60
Poletimber	219	59.7	82	40	16	
Seedling-Sapling	18	4.9	80	2	1	
Nonstocked	1	0.3	80	15	6	
Total	367	100	82	244	100	60

Table 10

Summary of Annual Net Growth and Mortality Per Acre

By Sawtimber Types

Major Sawtimber Types	Annual Net Growth Per Acre			Annual Mortality Per Acre			Area in Type Acres	Total Annual Net Growth			Total Annual Mortality		
	Int. ¼-In. B.F.	Scribner Dec. C B.F.	Cubic Ft. C.F.	Int. ¼-In. B.F.	Scribner Dec. C B.F.	Cubic Ft. C.F.		Int. ¼-In. M B.F.	Scribner Dec. C M B.F.	Cubic Ft. M C.F.	Int. ¼-In. M B.F.	Scribner Dec. C M B.F.	Cubic Ft. M C.F.
Douglas-fir	3.53	2.21	0.48	5.23	3.75	2.75	2,591	9	6	1	14	10	7
Ponderosa Pine	0.30	.25	0.08	0.19	0.17	0.05	1,560						
Lodgepole Pine	33.00	28.68	8.69	13.00	11.07	3.20	128,901	4,254	3,697	1,120	1,676	1,427	412
Spruce-Fir	44.11	38.64	8.34	27.86	23.96	5.83	186,830	8,241	7,219	1,558	5,202	4,476	1,089
Limber Pine	0.01	0.07	0.17	2.37	2.05	0.58	665				2	1	
Totals							320,547	12,504	10,922	2,679	6,894	5,913	1,508

Growth and Mortality

Growth and mortality are based on forest survey data. The calculation is explained under "Supporting Data." Table 11 shows the growth and mortality for the sawtimber types. The net annual growth is 34.2 board feet, Scribner Decimal C, per acre for all sawtimber types, based on the past 10 years.

The total annual net growth and mortality for the sawtimber type is:

Kind of Volume	Total Annual Net Growth	Total Annual Mortality
Scribner Dec. C	10,922 M B.F.	5,913 M B.F.
International 1/4"	12,504 M B.F.	6,894 M B.F.
Cubic Feet	2,679 M C.F.	1,508 M C.F.

The following shows the growth and mortality per acre for the lodgepole pine poletimber type by species:

Species	Percent	10-Year Gross Growth C.F.	10-Year Mortality C.F.	Annual Net Growth C.F.
Douglas-fir	00.2	4.76	0.45	0.43
Lodgepole Pine	87.7	208.13	23.69	18.44
Limber Pine	00.1	0.32	--	.03
Subalpine Fir	03.6	26.86	7.75	1.91
Engelmann Spruce	06.2	33.04	7.80	2.52
Aspen	02.2	12.14	6.95	0.52
Totals Weighted By Percent	100	185.82	21.69	16.40

The annual net growth in the lodgepole pine poletimber type is about twice that for the sawtimber type. The annual net growth for the entire lodgepole pine type is 13.3 cubic feet per acre.

Mortality is due largely to disease. Most of the sawtimber is overaged and mortality can be expected to increase until such time that the overaged timber is harvested.

Empirical yield tables are not available as no experience has been built up on what can be expected under management. However, it is estimated that a potential growth of from 40 to 100 cubic feet per acre per year, depending on the sites, can be expected under good management.

Prior to the end of this planning period the growth and mortality will be re-examined. If there is any great change, the adjustment period will be revised accordingly.

Calculation of Allowable Cut

Lodgepole Pine Type

Considering the lack of growth, the lodgepole pine sawtimber and poletimber types will be regulated for cutting. An 80-year adjustment period is used for calculating the allowable cut. This period was adopted in order to assure an adequate supply of pulpwood and sawtimber on a sustained yield basis. In reality this places the type on an 80-year rotation. Most of the poletimber type is now 80 to 100 years of age and it supports merchantable volumes of pulpwood. Since these stands grew under wild conditions, i.e., unmanaged, there should be no difficulty in producing a much greater volume per acre during the same length of period under good management.

One of the management objectives is to establish a pulp mill at Kremmling, Colorado. A shorter adjustment period of 40 or 50 years would not provide an adequate supply of wood beyond a 50-year contract period, since only 5 percent of the type is now in seedling-sapling or smaller size stand classes.

The allowable cut is shown separately for lodgepole pine poletimber, lodgepole pine sawtimber and spruce-fir sawtimber types. The allowable cut from the lodgepole pine poletimber type will be realistic only after a pulp mill has been established. Such a pulp mill could utilize wood from all three types and would probably require at least 50 percent of the total allowable cut for the working circle.

Table 11 shows the allowable cut in cubic feet for each 10-year period for the first 50 years of the adjustment period. An equal volume of timber to be cut was set up for each period. Growth was calculated at midpoint of the period. The area was then adjusted to reflect the total volume.

The annual allowable cut for the lodgepole pine type for the next 10 years, based on the tabulation method, is:

Stand Size Class	Area	Cubic Foot Volume
Sawtimber	1,440 acres	4,200 M C.F.
Poletimber	3,170	4,600
Total	4,610	8,800

The cubic foot allowable cut is converted to board feet by using the following converting factors:

Cubic feet to Scribner Dec. C is 3.45
Cubic feet to International $\frac{1}{4}$" is 4.20

Scribner Decimal C
4,200 x 3.45 = 14,490 M B.F. or rounded to 14.5 MM B.F.

International $\frac{1}{4}$"
4,200 x 4.20 = 17.6 MM B.F.

This compares with other area calculations as follows:

a. Straight area calculation based on rotation age

$$\frac{300,000 \text{ acres}}{80} = 3,750 \text{ acres per year.}$$

3,750 acres x 1,910 cubic feet = 7.2 MM C.F. per year.

b. The Kemp formula

$$\frac{129,000 \times 7 + 219,000 \times 5 + 18,000 \times 3 + 1,000}{320} = \frac{2,053,000}{320} = 6,400 \text{ acres}$$

6,400 x .82 (operability factor) = 5,200 acres.

5,200 acres x 1,910 cubic feet = 9.9 MM C.F. per year.

The volume by species to be cut from the 4,610 acres of lodgepole pine is estimated to be as follows:

Species	Sawtimber Type		Poletimber Type		Total	
	Percent	M C.F.	Percent	M C.F.	Percent	M C.F.
Lodgepole Pine	87.80	3,688	87.70	4,034	87.8	7,722
Engelmann Spruce	10.20	428	6.20	285	8.1	713
Subalpine Fir	1.93	81	3.60	166	2.8	247
Douglas-fir	0.07	3	0.20	9	0.1	12
Limber Pine	--	--	0.10	5	0.1	5
Aspen	--	--	2.20	101	1.1	101
Total	100	4,200	100	4,600	100	8,800

The Scribner Decimal C board foot volume by species for the sawtimber type is:

Species	Percent	M B.F.
Lodgepole Pine	87.30	12,659
Engelmann Spruce	11.49	1,666
Subalpine Fir	1.11	161
Douglas-fir	0.10	14
Total	100.00	14,500

Spruce-Fir Sawtimber Type

There are 186,830 acres of sawtimber type which is 77 percent of the total spruce-fir area. It is estimated that 60 percent is operable. This leaves 112,000 acres to be regulated for harvesting.

The average annual net growth is 38.64 board feet per acre in sawtimber size and 8.34 cubic feet for trees five inches D.B.H. and larger.

Engelmann spruce bark beetles are endemic in the area. Vigorous detection and control methods will be applied to prevent epidemic outbreaks on the forest.

A 100-year adjustment period has been selected to convert the spruce-fir sawtimber stands from a wild to a managed condition. This 100-year adjustment period is, however, subject to change if losses from the spruce bark beetle, or other insects or diseases, become a problem. As far as practicable, the oldest stands will be harvested first to minimize losses and to favor growth.

The allowable annual cut by area and volume is shown in Table 11. This was calculated using a tabulation method. The acreage was adjusted to maintain an equal volume for each period.

The allowable annual cut for the first 10-year period is:

Area	1,150 acres
Volume	3,600 M Cubic Feet

The cubic foot volume allowable cut is converted to board feet by using a converting factor of 3.87 for Scribner Decimal C and 4.65 for International $\frac{1}{4}$" Log Scale. These computed are:

Scribner Decimal C
3,600,000 x 3.87 = 14.0 MM B.F.

International $\frac{1}{4}$"
3,600,000 x 4.65 = 16.7 MM B.F.

A comparison of the area by the tabulation method with other methods follows:

a. Straight area control is:

$$\text{Total acres spruce-fir type} \quad \frac{149{,}260 \text{ acres}}{\text{Rotation} \quad 140 \text{ years}} = 1{,}066 \text{ acres per year.}$$

1,066 acres x 12,369.44 board feet = 13.2 MM B.F. per year.

Table 11

Allowable Cut - Area and Cubic Foot Volume
By 10-Year Periods For the Next 5 Periods

Period	Type and Stand Size Class	Area To Be Cut By Periods	Volume per Acre: Beginning of Period CF	Volume per Acre: Net Growth CF	Volume per Acre: Total CF	Total Volume For Period MCF
1st	Lodgepole Pine					
	Sawtimber Type (LP9)	14,400	2,873	43	2,916	42,000
	Poletimber Type (LP8)	31,700	1,365	82	1,447	46,000
	Spruce-Fir					
	Sawtimber (SF9)	11,500	3,142	42	3,184	36,000
2nd	Lodgepole Pine					
	Sawtimber	14,000	2,959	43	3,002	42,000
	Poletimber	28,500	1,529	82	1,611	46,000
	Spruce-Fir					
	Sawtimber	11,000	3,225	42	3,267	36,000
3rd	Lodgepole Pine					
	Sawtimber	13,600	3,045	43	3,088	42,000
	Poletimber	25,800	1,693	82	1,775	46,000
	Spruce-Fir					
	Sawtimber	10,600	3,308	42	3,350	36,000
4th	Lodgepole Pine					
	Sawtimber	13,200	3,131	43	3,174	42,000
	Poletimber	23,500	1,857	82	1,939	46,000
	Spruce-Fir					
	Sawtimber	10,200	3,392	42	3,434	36,000
5th	Lodgepole Pine					
	Sawtimber	12,900	3,217	43	3,260	42,000
	Poletimber	21,700	2,021	82	2,103	46,000
	Spruce-Fir					
	Sawtimber	10,000	3,475	42	3,517	36,000
	Total Area					
	Lodgepole Pine					
	Sawtimber	68,100				
	Poletimber	131,200				
	Spruce-Fir					
	Sawtimber	53,300				

b. Area in sawtimber divided by the adjustment period of 100 years is:

Sawtimber type $\frac{112,185 \text{ acres}}{100}$ = 1,122 acres per year.

1,122 acres x 12,369.44 board feet = 13.9 MM B.F. per year.

c. The Kemp formula gives:

$$\frac{7(112,185) + 5(25,143) + 3(1,543) + 10,389}{4 \times 140 \text{ years}} = 1,654 \text{ acres per year.}$$

1,654 acres x 12,369.44 board feet = 20.5 MM B.F. per year.

The volume to be cut is broken down into species as follows:

Species	Board Foot		Cubic Foot	
	Percent	M B.F.	Percent	M C.F.
Engelmann Spruce	81.64	11,430	74.39	2,678
Subalpine Fir	10.76	1,506	17.31	623
Lodgepole Pine	6.61	925	7.24	261
Limber Pine	00.25	35	00.27	10
Aspen	00.74	104	00.79	28
Total	100	14,000	100	3,600

Allowable Cut Beyond the Adjustment Period

There should be very little reduction, if any, in the volume allowable cut after the adjustment periods for both lodgepole pine and spruce-fir types. There will be a gradual conversion of the aspen type back to a coniferous type; this will mean an increased acreage of conifers. Growth will also be improved, which will mean an increased volume per acre.

It is estimated that the distribution of stand size classes at the end of the adjustment period will be as follows:

Stand Size Class	Type	
	Lodgepole Pine Acres	Spruce-Fir Acres
Sawtimber	70,000	130,000
Poletimber	100,000	40,000
Seedling-Sapling	180,000	60,000
Nonstocked	20,000	10,000
Total	370,000	240,000

The Kemp formula using the above data gives an allowable cut of 4,800 acres for the lodgepole pine type and 2,300 acres for the spruce-fir type. This is a total of 7,100 acres as compared with the current 5,760 acres allowable cut. If the current operability factors are applied, the acreage would be about the same.

The future supply of pulpwood would come from intermediate cuts, as well as harvest cuts, in the lodgepole pine type. With an expected growth rate of one cord per acre in the poletimber type, there should be no question but what the current volume allowable cut could be maintained or increased.

The current allowable cuts provide for obtaining an acceptable distribution of age classes by the beginning of the second rotation period.

Volume in the Unregulated Types

Douglas-fir - There are 4,868 acres of Douglas-fir of which 2,591 acres are classed as sawtimber size. The average volume per acre is 5,989.25 board feet or a total of 15,519 M B.F. of Douglas-fir and associated species. The stock of sawtimber-size trees is generally classed as poor. The type is usually found on poor sites. At the present time most of the area would be classed as inoperable due to steepness and rocky outcrops. Under these conditions very little, if any, cutting will take place in the type.

Dead Spruce - 3,999 acres of dead spruce were typed. The average volume per acre is 4,324.93 cubic feet; using the stock and stand table for dead spruce type on the adjoining Yampa River Working Circle, it is estimated that very little timber will be cut in this type. Timber cut in the type will not be charged against the regulated cut.

Aspen - There were 40,295 acres typed as aspen. 32,121 acres are of poletimber size or larger. The average volume per acre is 1,446.45 cubic feet. The total volume is 37,154 M C.F. or 437 M cords. At the present time there is no market for this species and none is expected to develop during the next 10 years.

Cutting Budget

The cutting budget for this period is shown in Table 12. Selection of compartments in which cutting is scheduled was based on the age and the condition of the sawtimber stands. The areas are distributed over the working circle and are within reasonable hauling distances of community centers that either support or could support a sawmill industry. The schedule will permit an orderly harvesting of the working circle.

A cutting budget will not be set up for pulpwood until a demand has been developed for the product. The cutting budget will be coordinated with the needs of the industry and with adjacent working circles.

The following is a list of compartments that may be offered for pulpwood:

Block A

012	Blacktail Creek	(Routt N.F.)
017	Rock Creek	(Routt N.F.)
018	Rabbit Ears	
019	Silver Creek	(Routt N.F.)
021	Red Dirt	
022	Gore	

Block B

004	Gilsonite
005	Buffalo
006	Denver
007	Hall Creek
008	Cabin Creek
011	Gold Run
012	Stillwater
015	Troublesome
016	Siebert
017	West Fork
018	Rabbit Ears

Block C

023	Williams
024	Cataract (in part)
025	Slate Creek
026	Rock Creek
027	Pass Creek
028	Green Mountain

Block D

029	Cottonwood
030	Beaver
031	Muddy
032	Morgan Gulch
036	Keyser Divide
037	Keyser (in part)
038	Leal
039	Darling
047	Crooked Creek

Block E

042	Monarch
043	Strawberry
045	Meadow Creek
046	Hurd Creek
050	Vasquez Creek
051	Little Vasquez
052	Fraser River
053	Ranch Creek

Block F

071	Porcupine
072	Straight Creek
073	Willow Creek
074	No. Tenmile
075	Officer's Gulch
076	Miner's Creek
077	Barton
079	Keystone

Table 12

CUTTING BUDGET
FY 1962 - 1971

Compartment No.	Compartment Name	Ranger District	Gross Sawtimber Area in Compartment	Lodgepole Pine Sawtimber Type Net Area Acres	Lodgepole Pine Sawtimber Type Volume MM B.F.	Spruce-Fir Sawtimber Type Net Area Acres	Spruce-Fir Sawtimber Type Volume MM B.F.	Total Volume MM B.F.
Timber Under Contract But Uncut as of June 30, 1961								25
49	Elk Creek	Fraser	1,990	800	8	400	5	13
50	Vasquez Creek	Fraser	7,999	100	1			1
1	Baker Gulch	Sulphur	1,110	100	1	100	1	2
30	Beaver Creek	Sulphur	3,480	1,600	16	400	5	21
38	Leal	Sulphur	4,520	1,000	10	1,400	17	27
45	Meadow Creek	Fraser	3,610	300	3	1,000	12	15
87	Indian Creek	Kremmling	2,542	1,100	11	400	5	16
11	Gold Run	Sulphur	2,314	500	5	700	9	14
12	Stillwater	Sulphur	2,829	500	5	1,000	12	17
3	Upper Willow Cr.	Sulphur	8,956	200	2	500	6	8
52	Fraser River	Fraser	7,910	900	9	--		9
42	Monarch Lake	Fraser	10,642	300	3	--		3
20	Hitzer	Kremmling	8,917	4,000	40	900	11	51
9	Corral Creek	Sulphur	3,955	2,000	20	300	4	24
13	Supply Creek	Sulphur	3,475	900	9			9
67	Bear Creek	Clear Creek	15,250	--		400	5	5
51	Little Vasquez	Fraser	2,610	1,100	11	--		11
46	Hurd Creek	Fraser	4,210	400	4	--		4
8	Cabin Creek	Sulphur	5,392	2,000	20	--		20
24	Cataract	Kremmling	5,054	400	4	2,200	27	31
28	Green Mountain	Kremmling	2,465	600	6	700	9	15
2	Bowen Gulch	Sulphur	4,970	600	6	1,900	24	30
67	Bear Creek	Clear Creek	15,250	1,600	16	2,000	25	41
14	Timber Creek	Kremmling	3,240	--	--	700	9	9
	Total			21,000	210	15,000	186	421

TRANSPORTATION

Table 13 shows the road survey and construction program necessary to harvest the timber listed in the 10-year cutting budget.

Timber purchaser construction or a combination of purchaser and Forest Service construction will be required for the larger offerings. This is necessary since government funds have never been adequate for the construction of all timber access roads.

All roads listed in Table 13 are primarily for the purpose of timber access. Where heavy all-purpose use of the road is anticipated, the Forest Service will finance from all-purpose funds standards above that required to remove the timber.

Right-of-Way Needs

Rights-of-way will be obtained sufficiently in advance of road construction to avoid delays in construction. Table 14 lists the rights-of-way needed and scheduling necessary to meet the cutting budget.

Table 13

Timber Access Road Development Program
FY 1962-1971

Compartment Name	No.	Road Name	Road No.	Class	Construction By	Est. Miles	Estimated Cost Per Mile	Total Cost	Date Survey Required	Remarks
			158							
Elk Creek	049	Elk Creek	1592	SH	Purchaser	7	12,000	84,000	FY 1961	Sell (FY 1962)
Vasquez	050	Little Vasquez	244	SN	Purchaser	3	5,000	15,000	FY 1961	Sell (FY 1962)
Baker Gulch	001	Baker Gulch	-	SN	Purchaser	0	-	-	FY 1961	Sell (FY 1962)
Beaver Creek	030	Beaver Creek	133	SH	Contract	12	-	Completed		Sell (FY 1961)
								5 mi. completed - 10 miles		
Kinney Creek	038	Kinney Creek	140	SH	Contract	15	15,000	225,000	FY 1962	Sell (FY 1962)
	045									
Hurd Creek	046	Meadow	129	SH	Purchaser	5	12,000	60,000	FY 1962	Sell (FY 1962)
Indian Creek	087	Chimney Rock	102	SH	Contract	12	12,000	144,000	FY 1962	Sell (FY 1963)
	011									
Trail Creek	012	Trail Creek	116	SH	Contract	10	12,000	120,000	FY 1962	Sell (FY 1963)
Bill Creek	003	Bill Creek	107	SH	Purchaser	4	10,000	40,000	FY 1962	Sell (FY 1963)
Parsenn	052	-	-	SN	Purchaser	1	6,000	6,000	FY 1963	Sell (FY 1964)
Mill Creek	042	Meadow Creek	129	SN	Purchaser	1	6,000	6,000	FY 1963	Sell (FY 1964)
Hitzer Lake	020	Routt Divide	100	SH	Contract	10	15,000	150,000	FY 1963	Sell (FY 1964)
Corral Creek	009	Corral Creek	123	SN	Purchaser	7	12,000	84,000	FY 1963	Sell (FY 1964)
Supply Creek	013	Supply Creek	119	SN	Purchaser	3	15,000	45,000	FY 1963	Sell (FY 1964)
Bear Creek	067	Indian Creek	196	SH	Contract	4	15,000	60,000	FY 1963	Sell (FY 1965)
Little Vasquez	051	Little Vasquez	244	SN	Purchaser	2	10,000	20,000	FY 1964	Sell (FY 1965)
Hurd Creek	046	Hamilton	130	SH	Purchaser	4	10,000	40,000	FY 1964	Sell (FY 1966)
Cabin Creek	008	Cabin Creek	112	SN	Purchaser	5	12,000	60,000	FY 1964	Sell (FY 1966)
Green Mountain	028	Spring Creek	201	SN	Contract	12	15,000	180,000	FY 1965	Sell (FY 1967)
Bowen Gulch	002	Bowen Gulch	120	SN	Purchaser	4	12,000	48,000	FY 1965	Sell (FY 1968)
Bear Creek	067	Bear Creek	195	SH	Contract	8	15,000	120,000	FY 1966	Sell (FY 1969)
Timber Creek	014	East Fork								
		Troublesome	105	DH	Contract	16	12,000	192,000	FY 1966	Sell (FY 1969)

Table 14

Timber Access Right-of-Way Needs

Compartment Name	Compartment Number	Road Name	Road Number	No. Easements	Volume MM B.F.	Year Needed
Meadow Creek	046	Hurd Creek	130	1	6.0	1962
Indian Creek	087	Chimney Rock	13081	2	43.0	1962
Gold Run-Stillwater	011-012	Trail Creek	116	3	10.0	1962
Hitzer Lake	020	Routt Divide	100	2	30.0	1963
Corral Creek	009	Corral Creek	123	1	20.0	1963
Supply Gulch	013	Supply Creek	119	1	10.0	1963
Bowen Gulch	002	Bowen Gulch	120	1	50.0	1965
Bear Creek	067	Indian Creek	196	1	20.0	1963
Green Mountain	028	Spring Creek	201	5	100.0	1965
Cataract	024	Spring Creek	201			1965
Bear Creek	067	Bear Creek	195	1	115.0	1966
Timber Creek	014	East Fork Troublesome	105	3	100.0	1966

All of the above rights-of-way are currently being processed.

SALES POLICY

The proposed pulpwood offering will be approximately 5 to 6 million cords. Two-thirds of this amount will come from this working circle and the remainder from the Routt National Forest.

It is estimated that 38 percent of the volume will come from lodgepole pine poletimber stands, 28 percent from lodgepole pine sawtimber stands and 34 percent from spruce-fir sawtimber stands within a radius of 40 miles of Kremmling, Colorado. An annual cut of 7 million cubic feet of pulpwood would represent 56 percent of the total allowable cut.

The remaining 44 percent of the annual allowable cut represents approximately 20 million board feet. The average annual cut for the past 10 years is 19.2 million board feet. The highest cut in any one year was 24 million feet and the lowest 14 million board feet. The average annual cut for the past five years is 18 million feet.

The 44 percent of the allowable cut would be adequate to meet the needs,at the current level of cutting, of the established sawtimber industry.

Sawtimber offering will be made in units up to 50 million board feet more or less. This will be ample to permit the larger mills to maintain a 3 to 5 year supply of wood. Smaller offering of 5 million feet or less will be made to meet the needs of the smaller plants.

Points of Manufacture

Timber in the northern portion of the forest will be appraised to logical towns along the Denver & Rio Grande Western Railroad. Timber in the southern part of the forest will be appraised to the nearest logical town.

Merchantability Specifications

The minimum size sawtimber tree in lodgepole pine is 10" D.B.H. and to a six-inch top D.I.B. For all other species the minimum size tree is 10" D.B.H. to an eight-inch top D.I.B. Maximum stump height for all species is 12 inches.

For pulpwood, the minimum size for all species except dead spruce is five-inch D.B.H. and to a four-inch D.I.B. The tree must have at least one eight-foot pulpwood stick that is reasonably straight. Maximum stump height is eight inches.

Logging Methods

Presale prescriptions will specify the method of logging that will be permissible for each sale. The use of tractor and animal skidding is acceptable. Jammer or cable skidding is acceptable for clear-cut areas.

Special consideration will be given to Engelmann spruce slash disposal due to the potential hazard from bark beetles. Complete slash disposal, entire tree skidding with slash and cull disposal at the landing, or other similar methods, will be prescribed for spruce sales.

Considering the importance of other uses in the working circle, a good logging and clean-up job will be required. Cutover areas will be left in a condition that will not materially curtail other approved uses of the land.

TIMBER STAND IMPROVEMENT

Reforestation

The recent forest inventory classified certain timber types as poorly stocked and nonstocked, Table 4. These areas will be examined on the ground to determine if they are not adequately stocked with seedlings. The stand condition description in the compartment records will define areas in need of reforestation. The compartment records are scheduled for completion within one year after the approval of this plan.

The expected planting job for the next two decades is shown in Table 15. The scheduling of the program is set up in the forest planting plan.

Seed Orchard Establishment

To insure an adequate supply of seed and planting stock of reliable viability and genetic quality, an area of 200 acres will be reserved for seed production. This project will be initiated in 1961 to assure planting stock in three years.

Measures to Aid or Control Natural Regeneration

In the spruce-fir type, logging and slash disposal methods will be used which will result in an improved seed bed.

In the lodgepole pine type, the method of logging and slash disposal will be varied as necessary to aid in controlling the amount and distribution of reproduction.

Thinning

1. Noncommercial

   Noncommercial weeding and thinning in the lodgepole pine and the spruce-fir types will be done on all overstocked areas of noncommercial-size trees where site quality and age indicate that satisfactory response may be expected. Noncommercial thinnings in lodgepole pine will not be made in stands over 70 years of age. Additional areas needing noncommercial thinning are anticipated from 30,000 acres to be clear cut in this period. This will be done by sale area betterment funds. Noncommercial thinning in the spruce-fir type will be limited in magnitude until better stocking requirements are developed.

2. Commercial Thinning

Commercial thinning, i.e. intermediate cuts, will be done on some 1,000 acres of lodgepole pine poletimber to supply the post and pole market at Fraser, Colorado. This area will be in the Fraser and Granby Blocks.

Intermediate cuts will normally be limited to those commercial size stands that had received a noncommercial thinning prior to the time that the stand had reached 70 years of age.

Table 15

THE PLANTING JOB -- 1962 to 1971

Type	Nonstocked (Acres)	Understocked Seedling-Sapling Stands (Acres)	Poletimber Size Stands to be Clear Cut (Acres)	Planting Needed to Re-establish Conifers in Aspen Type (Acres)	Planting Needed on Sawtimber Areas to be Cut Over after 1961 (Acres)	Total
Lodgepole Pine	300	400	21,000			21,700
Spruce-Fir	4,000	700		5,000	11,500	21,200
Total	4,300	1,100	21,000	5,000	11,500	42,900

THE PLANTING JOB -- 1962 to 1981

Type	Nonstocked (Acres)	Understocked Seedling-Sapling Stands (Acres)	Poletimber Size Stands to be Clear Cut (Acres)	Planting Needed to Re-establish Conifers in Aspen Type (Acres)	Planting Needed on Sawtimber Areas to be Cut Over after 1961 (Acres)	Total
Lodgepole Pine	600	800	41,000			42,400
Spruce-Fir	7,000	700		20,000	22,500	50,200
Total	7,600	1,500	41,000	20,000	22,500	92,600

PROTECTION

Insects

1. Insect Conditions

Since the epidemic of Engelmann spruce bark beetles (Dendroctonus engelmanni) in the early 1950's, only small outbreaks have occurred in the spruce type. Generally these outbreaks have occurred in the leave strips of logged areas. Special measures have been necessary to keep the outbreaks under control.

Bark beetle activity in the lodgepole pine type has been light for the past several years. No special control measures have been necessary.

2. Action Program

Seventy-six percent of the spruce-fir type is of sawtimber size. Most of this is past rotation age and is considered a high bark beetle risk. A considerable portion of the type has no access roads, making detection and maintenance control costly. A skeleton road system will be planned and constructed into the type as fast as funds permit. Key timber-purchaser-constructed roads in the spruce type will be kept on the road system for potential insect detection and control needs.

a. Lodgepole Pine Type - A continuing carefully administered protection program will be maintained so that potential epidemics can be recognized and controlled.

b. Spruce-Fir Type - Logging slash and cull logs that would harbor spruce bark beetles will be bunched and burned before the emergence of the beetles. This will be done by tree-length skidding or any other method that will bunch the material for burning. New timber sale contracts will provide for the slash and cull log treatment described. Also, extended contracts and those that provide for rate redetermination will be modified to require this type of insect control.

Disease

1. Disease Conditions

Seventy-five percent of the lodgepole pine type is infected with dwarfmistletoe (Arceuthobium americanum). Control measures consist of removal of infected trees by commercial sales and by girdling, poisoning or pushing over the residual stand.

2. Action Program

a. Past Sales - On old sales where only partial cutting was done and K-V funds were not collected, the residual stands of more than five cords per acre will be commercially clear cut.

In stands of less than five cords per acre, the infected trees will be destroyed. P&M funds will be used.

b. On sales where K-V funds were collected, the treatment will be:

(1) Where the residual stand is less than five cords per acre, and no market exists or is foreseen in the near future, the trees will be destroyed.

(2) Where the residual stand is over five cords per acre, no control work will be undertaken except with the approval of the forest supervisor.

c. Poletimber-size Stands - Control will be by commercial sales as for pulpwood.

3. The 10-Year Program

The 10-year control program will consist of treating approximately 7,000 acres of residual stands. The treating will be accomplished with K-V funds.

On areas where K-V funds were not collected, a survey will be made to determine the extent of infestation and the control measures needed. This job will be completed by 1965. Pending the completion of the survey, 100 acres of infected, residual stand of five cords or less per acre will be treated annually.

Appropriated funds will be necessary and budgeted for the job.

Animals

1. Porcupines

All users of the forest will be encouraged to kill porcupines. When necessary, employees will be furnished small bore ammunition for porcupine control.

2. Other Rodents

Control measures will be taken when necessary to prevent rodent damage to plantations.

Fire

Provision is made in current sales for reduction of slash or for extra protection for slash areas until the hazard has been abated naturally.

Protection Program

1. A slash disposal plan will be prepared for each sale area in accordance with instructions in FSH 5100.

2. The forest will maintain the necessary equipment and protection organization adequate to keep commercial timberland fires within the annual "PAR" in the fire prevention plan. The equipment and organization necessary will be specified in the presuppression plan.

SUPPORTING DATA

Compartment Records

Within one year after the approval of this plan, a system of compartment records will be set up for each ranger district. This will consist of Form R2-2400-19 and a map maintained in an atlas-size binder for each compartment within the ranger district. The R2-2400-19 will be posted annually. Since balances may be struck at any time, the form provides for a continuous inventory of the compartment. Compartment descriptions for at least those compartments scheduled for cutting during the 10-year period will also be included in the atlas binder. Such descriptions may be made on the back of R2-2400-19. Detailed instructions are in the compartment binder.

Timber Inventory

This plan revision is based on inventory data obtained from the cooperative Forest Survey - Region 2 Inventory Program conducted during 1957-1961.

The inventory was conducted to standards prescribed and agreed to by Forest Survey of the Intermountain Forest and Range Experiment Station, and the Division of Timber Management of Region 2 (Reference, Field Instructions for Forest Inventory, Rocky Mountain Region, 1956). Forest Survey read the plots and processed the data; Region 2 delineated the types on aerial photographs, transferred the types to planimetric maps, printed the final type maps and calculated the area of the types.

Sampling Error

Volume data was based on plots taken at 184 locations. Two plots were taken at each location. Table 26 shows the number of locations for each volume stratum. It was estimated that the 184 locations would give a sampling error for the total cubic foot volume of not to exceed five percent (one standard error) for the working circle.

There is no sampling error in the area determination since the calculations were based on a 100 percent typing job.

Data Processing

Forest Survey of the Intermountain Forest and Range Experiment Station processed the data through the ADP section of the Pacific Southwest Station. This was done in accordance with the "Plan for Compilation of the Intermountain Forest Survey, Rocky Mountain Area, by IBM Method", October 1, 1956 by Robert M. Miller.

The following NFA tables are on file in the supervisor's office at Golden, Colorado:

Area

NFA 2 - Compartment Area
NFA 3 - Block Area Summary
NFA 4 - Working Circle Area Summary

Volume

NFA 6 - Total average net volume per acre by merchantability class, volume stratum, species and 10-inch D.B.H. class.

NFA 7 - Total average net volume per acre by merchantability class, volume stratum, species and two-inch D.B.H. class.

NFA 31- Adjusted 10-year gross growth and 10-year mortality volume per acre by growing stock.

Miscellaneous Tables - Number of trees per acre and various Forest Survey summaries.

Copies of the plot tally sheets are on file in the forest supervisor's office.

Aerial photographs on which the photo interpretation was done are on file at the Denver Federal Record Storage Center.

Type map plates are stored in the Division of Timber Management, Forest Service, Denver, Colorado.

Method for Calculating Periodic Annual Net Growth

NFA Table No. 31 in the IBM binder gives the average adjusted 10-year growth increment and the 10-year mortality by growth stratums, species, and two-inch D.B.H. classes. The volumes are shown in both board feet and cubic feet.

The growth stratum codes are as follows:

GS-01 = All conifer sawtimber stands.
GS-02 = All conifer poletimber stands.
GS-03 = All conifer seedling and sapling and nonstocked stands.
GS-04 = All hardwood stands.

The gross 10-year growth is based upon merchantability class (MC-1) trees. These are all live, merchantable trees. Mortality is shown under merchantability class (MC-7) trees. These are all mortality trees. The Forest Survey crews estimated the trees that died during the past five years. This volume was then doubled to put it on the same period as the growth. The growth was based on the past 10 years.

The periodic annual net growth per acre can be determined for any given species and D.B.H. class within a growth stratum, or the total of all species in D.B.H. classes within a growth stratum, by subtracting the volume shown for the average 10-year mortality (MC-7) from the average 10-year growth increment (MC-1) and dividing by 10.

Growth stratums do not correspond to volume stratums. The total volume of timber in the working circle and the allowable cuts are based upon volume stratums. It was, therefore, necessary to construct a growth and mortality table for the volume stratums using the data given in NFA Table 31. This was done by weighting the growth and mortality of the species in the growth stratums by the percent of each species in the volume stratums.

Table 16

Distribution of Site Trees
By Major Types, Age Classes, Stand Size Classes, Stocking Classes

Major Types	Age Groups	Sawtimber						Poletimber						Seedling-Sapling						Nonstocked					
		Trees			Percent			Trees			Percent			Trees			Percent			Trees			Percent		
		W	M	P	W	M	P	W	M	P	W	M	P	W	M	P	W	M	P	W	M	P	W	M	P
Lodgepole Pine	1-19																								
	20-40								3			5.4			2		1			100	100				
	40-60							9	17	3	25.0	30.4	37.5	2			33.4								
	60-80		1	4		2.9	11.4	7	18		19.4	32.0		2			33.4								
	80-100		2	7		5.8	20.0	9	8		25.0	14.3		1			16.6								
	100-120		4	6		11.8	17.2	5	3		13.8	5.4		1			16.6								
	120-140		1	1		2.9	2.9	3	4	2	8.3	7.1	25.0												
	140-160		7	4		20.7	11.4	1	2		2.8	3.6													
	160-180		19	13		55.9	37.1	2	1	3	5.7	1.8	37.5												
	Total	0	34	35	0	100	100	36	56	8	100	100	100	6	2		1	100		100	100				
Engelmann Spruce	1-19																								
	20-40																								
	40-60		2			2.4	5.5		2			50.0													
	60-80		1			1.2	8.3	1	2	1	25.0	33.3	25.0												
	80-100		2			2.4	8.3		1	1		16.7	25.0												
	100-120		2			2.4	11.1																		
	120-140		4			4.9	13.9																		
	140-160		11			13.5	13.9																		
	160-180		10			12.2	8.3	1			25.0														
	180+		50			100	61.0	30.7	2	3		50.0	50.0												
	Total	2	82	36		100	100	100	4	6	4	100	100	100			100								

W, M, and P refer to well, medium and poor stocking classes.

Table 17

Estimated Area By Age Classes

80 Years and Older for Major Types

Type and Stocking Class	Total Acres	Age Class 80 Per-cent	Acres	Age Class 100 Per-cent	Acres	Age Class 120 Per-cent	Acres	Age Class 140 Per-cent	Acres	Age Class 160 Per-cent	Acres	Age Class 180 Per-cent	Acres	Total Percent
Lodgepole Pine Sawtimber														
Well Stocked														
Med. Stocked	62,888	2.9	1,832	5.8	3,365	11.8	7,456	2.9	1,833	20.7	13,080	55.9	35,322	100.0
Poor.Stocked	48,874	11.4	5,572	20.0	9,775	17.2	8,406	2.9	1,417	11.4	5,572	37.1	18,132	100.0
Total	111,762	6.6	7,404	11.8	13,140	14.2	15,862	2.9	3,250	16.7	18,652	47.8	53,454	100.0
Lodgepole Pine Poletimber														
Well Stocked	74,415	44.4	33,040	25.0	18,604	13.8	10,269	8.3	6,176	2.8	2,084	5.7	4,242	100.0
Med. Stocked	88,785	67.8	60,197	14.3	12,696	5.4	4,794	7.1	6,304	3.6	3,196	1.8	1,598	100.0
Poor.Stocked	26,394	37.5	9,898					25.0	6,598			37.5	9,898	100.0
Total	189,594	54.4	103,135	16.5	31,300	7.9	15,063	10.1	19,078	2.8	5,280	8.3	15,738	100.0
Spruce-Fir Sawtimber														
Well Stocked	310											100.0	310	100.0
Med. Stocked	96,958	3.6	3,490	2.4	2,327	2.4	2,327	4.9	4,751	13.5	13,089	73.2	70,974	100.0
Poor.Stocked	33,770	13.8	4,660	8.3	2,803	11.1	3,748	13.9	4,694	13.9	4,694	39.0	13,171	100.0
Total	131,038	6.2	8,150	3.9	5,130	4.6	6,075	7.2	9,445	13.6	17,783	64.5	84,455	100.0

Table 18

Average Net Volume Per Acre By Species and Crown Density Classes

LODGEPOLE PINE SAWTIMBER TYPE

Species	Crown Density Classes: Medium (VS 03) Int. ¼" BF	Medium (VS 03) Scrib. Dec. C BF	Medium (VS 03) Cubic CF	Poor (VS 04) Int. ¼" BF	Poor (VS 04) Scrib. Dec. C BF	Poor (VS 04) Cubic CF	Weighted Average Int. ¼" BF	Weighted Average Scrib. Dec. C BF	Weighted Average Cubic CF	Percent of Species Based on: Int. ¼"	Scrib. Dec. C	Cubic
Douglas-fir	20.66	17.34	3.94				11.65	9.78	2.22	0.10	0.10	0.07
Lodgepole Pine	12,775.23	10,611.39	2,811.20	7,634.37	6,153.41	2,148.22	10,533.21	8,667.18	2,522.07	87.34	87.30	87.80
Subalpine Fir	226.04	178.19	80.76	26.17	21.47	22.69	138.87	109.84	55.43	1.15	1.11	1.93
Engelmann Spruce	1,864.64	1,544.29	394.99	746.77	617.79	161.20	1,377.12	1,140.23	293.03	11.41	11.49	10.20
Total	14,886.57	12,351.21	3,290.89	8,407.31	6,792.67	2,332.11	12,060.85	9,927.03	2,872.75	100.00	100.00	100.00

Area in Volume Stratum			
Acres	72,685	56,216	128,901
Percent	56.39	43.61	100.00

Table 19

Stock and Stand Table
By DBH and Crown Density Classes

LODGEPOLE PINE SAWTIMBER TYPE

DBH Classes 10"	DBH Classes 2"	Crown Density Classes: Medium (VS 03) No. of Trees	Net Volume Int. ¼" BF	Net Volume Scrib. Dec. C BF	Net Volume Cubic Feet CF	Poor (VS 04) No. of Trees	Net Volume Int. ¼" BF	Net Volume Scrib. Dec. C BF	Net Volume Cubic Feet CF	Weighted Average No. of Trees	Net Volume Int. ¼" BF	Net Volume Scrib. Dec. C BF	Net Volume Cubic Feet CF
0	1.0-2.9	132.35				88.24				113.06			
	3.0-4.9	132.37				73.53				106.71			
1	5.0-6.9	57.35			232.94	40.06			211.49	52.86			223.58
	7.0-8.9	57.45			405.95	76.47			621.52	62.37			499.96
	9.0-10.9	42.67	3,012.65	2,306.80	541.99	50.00	3,577.26	2,740.78	640.61	45.85	3,258.89	2,496.07	585.01
2	11.0-12.9	37.80	4,075.74	3,339.22	731.20	20.00	2,124.46	1,737.65	380.66	30.04	3,224.75	2,640.75	578.32
	13.0-14.9	24.86	3,936.73	3,343.73	698.83	10.30	1,541.02	1,302.17	273.35	18.51	2,891.92	2,453.36	513.27
	15.0-16.9	8.82	1,786.03	1,542.36	316.57	3.68	748.52	647.29	132.47	6.58	1,333.55	1,152.00	236.28
	17.0-18.9	3.24	906.12	792.34	158.80	.74	231.20	201.23	39.86	2.15	611.78	534.55	106.93
	19.0-20.9	1.76	590.15	519.22	103.14	.44	184.85	163.55	32.15	1.18	413.39	364.10	72.18
3	21.0-22.9	1.03	429.38	377.54	75.65					.58	242.12	212.89	42.66
	23.0-24.9	.15	67.94	58.52	11.88					.08	38.31	33.00	6.70
	25.0-26.9	.15	81.83	71.48	13.94					.08	46.14	40.31	7.86
	Total	493.99	14,886.57	12,351.21	3,290.89	370.46	8,407.31	6,792.67	2,332.11	430.05	12,060.85	9,927.03	2,872.75

Table 20

Average Net Volume Per Acre By Species and Crown Density Classes

LODGEPOLE PINE POLETIMBER TYPE

Species	Crown Density Classes: Well (VS-14) Cubic Feet	Medium (VS-15) Cubic Feet	Poor (VS-16) Cubic Feet	Wt. Average Cubic Feet	Percent of Species
Douglas-fir	6.05			2.37	0.2
Lodgepole Pine	1,643.05	1,042.10	461.60	1,196.99	87.7
Limber Pine		3.30		1.54	0.1
Subalpine Fir	45.26	55.23	39.07	49.07	3.6
Engelmann Spruce	157.36	44.39	12.80	84.30	6.2
Aspen	0	65.50	0	30.68	2.2
Total	1,851.72	1,210.52	513.47	1,364.95	100.0
Area in Volume Stratum:					
Acres	85,966	102,660	30,524	219,150	
Percent	39.23	46.84	13.93	100.00	

Table 21

Stock and Stand Table
By DBH and Crown Density Classes

LODGEPOLE PINE POLETIMBER TYPE

Average Per Acre

DBH Classes 10"	DBH Classes 2"	Crown Density Classes: Well (VS 14) No. of Trees	Well (VS 14) Basal Area Sq.Ft.	Well (VS 14) Net Volume Cu.Ft.	Medium (VS 15) No. of Trees	Medium (VS 15) Basal Area Sq.Ft.	Medium (VS 15) Net Volume Cu. Ft.	Poor (VS 16) No. of Trees	Poor (VS 16) Basal Area Sq.Ft.	Poor (VS 16) Net Volume Cu.Ft.	Weighted Average No. of Trees	Weighted Average Basal Area Sq.Ft.	Weighted Average Net Volume Cu.Ft.
0	1.0-2.9	416.67	9.17		232.15	5.11		-			272.20	5.99	-
	3.0-4.9	375.00	32.62		116.07	10.10		-			201.48	17.53	-
1	5.0-6.9	155.56	30.49	612.78	117.87	23.10	414.29	31.25	6.12	118.83	120.59	23.64	451.00
	7.0-8.9	79.17	27.63	567.19	50.90	17.76	339.34	6.25	2.18	30.31	55.77	19.46	385.68
	9.0-10.9	18.06	9.84	217.04	20.53	11.19	209.72	12.50	6.81	189.76	18.44	10.05	209.81
2	11.0-12.9	11.11	8.72	216.21	8.05	6.32	131.08	3.76	2.95	63.32	8.65	6.79	155.04
	13.0-14.9	4.17	4.46	108.09	3.31	3.53	82.33	0.63	0.67	9.96	3.27	3.50	82.35
	15.0-16.9	1.67	2.33	55.93	0.54	0.08	18.92	2.51	3.50	78.65	1.26	1.76	41.76
	17.0-18.9	0.98	1.73	49.46	0.36	0.64	14.84	0.63	1.11	22.64	0.64	1.13	29.51
	19.0-20.9												
3	21.0-22.9	0.14	0.37	10.35							0.05	0.13	4.05
	23.0-24.9	0.14	0.44	14.67							0.05	0.16	5.75
	Total	1,062.67	127.80	1,851.72	549.78	77.83	1,210.52	57.53	23.34	513.47	682.40	90.14	1,364.95

Table 22

Average Net Volume Per Acre By Volume Stratum, Species and Crown Density Classes

SPRUCE-FIR SAWTIMBER TYPE

Volume Stratum			Kind	Volume By Species						Area in Vol. Stratum	
Number	Stand Size Class	Stocking Class	of Volume	Lodgepole Pine	Limber Pine	Subalpine Fir	Engelmann Spruce	Aspen	Total	Acres	Percent
07	LST	Medium	Inter.¼"			5,014.70	43,493.25		48,507.95	802	00.43
			Scrib.			4,271.50	38,103.57		42,375.07		
			Cubic Ft			975.69	7,363.99		8,339.68		
08	LST	Poor	Inter.¼"			2,064.35	13,543.62		15,607.97	287	00.15
			Scrib.			1,732.25	12,008.29		13,740.54		
			Cubic Ft			679.55	2,261.59		2,941.14		
09	SST	Well	Inter.¼"			6,979.65	18,109.57		25,089.22	310	00.17
			Scrib.			5,518.45	14,901.13		20,419.58		
			Cubic Ft			1,965.36	3,183.40		5,148.76		
10	SST	Medium	Inter.¼"	1,251.34		1,950.99	13,943.85	21.10	17,167.28	137,495	73.59
			Scrib.	1,033.59		1,574.52	11,716.30	17.90	14,342.31		
			Cubic Ft	270.79		635.55	2,707.55	3.81	3,617.70		
11	SST	Poor	Inter.¼"	210.52	152.86	602.85	5,302.93	395.14	6,664.30	47,936	25.66
			Scrib.	171.84	120.36	470.49	4,333.72	298.01	5,394.42		
			Cubic Ft	109.91	33.54	262.92	1,186.56	85.44	1,678.37		
Weighted Average for Sawtimber Type			Inter.¼"	974.88	39.22	1,626.95	11,860.13	116.92	14,618.10	186,830	100.00
			Scrib.	804.71	30.88	1,309.76	9,941.25	89.64	12,176.24		
			Cubic Ft	227.48	8.61	543.72	2,337.43	24.73	3,141.97		
Percent of Species by Kind of Volume			Inter.¼"	06.67	00.27	11.13	81.13	00.80	100.00		
			Scrib.	06.61	00.25	10.76	81.64	00.74	100.00		
			Cubic Ft	07.24	00.27	17.31	74.39	00.79	100.00		

Table 23

Stock and Stand Table
By D.B.H. and Crown Density Classes

SPRUCE-FIR SAWTIMBER TYPE

Average Per Acre

D.B.H. Classes		Stand Size and Crown Density Classes											
		Small Sawtimber											
		Well (VS 09)				Medium (VS 10)				Poor (VS 11)			
			Net Volume				Net Volume				Net Volume		
10" Class	2" Class	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF
0	1.0- 2.9					206.25				125.01			
	3.0- 4.9					56.25				140.63			
1	5.0- 6.9	50.00			220.88	65.63			241.42	71.88			217.01
	7.0- 8.9	50.00			365.75	50.01			335.91	45.31			262.41
	9.0-10.9	125.00	8,010.75	6,085.50	1,539.85	41.26	2,463.04	1,833.74	461.53	28.13	1,524.45	1,130.37	288.31
2	11.0-12.9	47.50	5,689.45	4,660.35	1,005.73	28.69	2,863.71	2,318.25	521.64	18.13	1,453.87	1,140.15	265.11
	13.0-14.9	37.50	5,836.03	4,911.20	1,045.45	21.32	3,230.03	2,712.75	571.64	10.00	1,242.11	1,026.18	223.07
	15.0-16.9	17.50	3,826.73	3,281.35	670.37	10.51	2,256.42	1,931.92	394.71	4.84	859.02	726.10	149.39
	17.0-18.9	2.50	589.28	504.40	101.68	7.57	2,169.55	1,879.97	376.08	2.66	640.64	551.11	110.69
	19.0-20.9					4.38	1,663.30	1,454.19	286.22	1.41	462.36	402.07	79.42
3	21.0-22.9	2.50	1,136.98	976.78	199.05	2.07	962.80	832.54	167.92	.47	184.03	155.52	32.96
	23.0-24.9					1.44	732.61	636.84	126.76	.16	70.94	60.79	12.42
	25.0-26.9					.50	382.82	342.10	63.13	.16	70.25	60.24	12.31
	27.0-28.9					.13	134.89	122.54	21.66	.16	156.63	141.89	25.27
	29.0-30.9					.06	44.11	39.28	7.33				
4	31.0-32.9					.13	176.44	161.87	27.90				
	33.0-34.9					.06	87.56	80.32	13.85				
	35.0-36.9												
	Total	332.50	25,089.22	20,419.58	5,148.76	496.26	17,167.28	14,342.31	3,617.70	448.95	6,664.30	5,394.42	1,678.37

(Table Continued)

Table 23 (Continued)

Stock and Stand Table
By D.B.H. and Crown Density Classes

SPRUCE-FIR SAWTIMBER TYPE

Average Per Acre

D.B.H. Classes		Stand Size and Crown Density Classes											
		Large Sawtimber								Weighted Average			
		Medium (VS 07)				Poor (VS 08)							
			Net Volume				Net Volume				Net Volume		
10" Class	2" Class	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF	No. of Trees	Int. ¼" BF	Scrib. Dec. C BF	Cubic Feet CF
0	1.0- 2.9	500.00								186.01			
	3.0- 4.9	250.00								78.55			
1	5.0- 6.9					50.00			142.50	66.90			233.93
	7.0- 8.9					25.00			133.00	48.55			315.35
	9.0-10.9									37.79	2,217.78	1,648.80	416.24
2	11.0-12.9	32.50	3,037.83	2,460.93	571.71	5.00	323.90	252.15	66.66	25.99	2,503.69	2,017.45	456.17
	13.0-14.9	15.00	2,508.38	2,117.80	441.21	2.50	287.00	241.90	56.42	18.39	2,716.84	2,276.40	481.67
	15.0-16.9	15.00	3,599.40	3,108.00	638.66	7.50	1,039.35	881.50	201.34	9.08	1,904.38	1,628.21	332.97
	17.0-18.9	22.50	7,018.53	6,101.25	1,221.45	5.00	1,049.45	904.75	189.15	6.36	1,793.72	1,552.29	310.86
	19.0-20.9	22.50	9,522.15	8,348.90	1,638.75	5.00	2,143.70	1,879.38	366.52	3.69	1,386.87	1,212.07	238.61
3	21.0-22.9	17.50	8,443.70	7,339.85	1,472.01	2.50	867.75	720.90	158.63	1.73	795.23	686.82	138.93
	23.0-24.9	7.50	4,412.18	3,873.73	747.07	2.50	1,039.08	883.33	184.48	1.14	577.89	502.25	99.96
	25.0-26.9	2.50	1,766.65	1,570.85	293.28	2.50	1,831.18	1,633.15	303.15	.42	310.16	276.47	51.34
	27.0-28.9	2.50	2,389.65	2,158.25	386.81	5.00	3,931.58	3,517.73	646.49	.16	155.76	141.26	25.08
	29.0-30.9	2.50	2,752.33	2,503.13	441.57					.05	44.27	39.65	7.29
4	31.0-32.9									.10	129.85	119.13	20.53
	33.0-34.9	2.50	3,057.15	2,792.38	487.16					.05	77.55	71.09	12.28
	35.0-36.9					2.50	3,094.98	2,825.75	492.80	--	4.77	4.35	0.76
	Total	892.50	48,507.95	42,375.07	8,339.68	115.00	15,607.97	13,740.54	2,941.14	484.96	14,618.10	12,176.24	3,141.97

Table 24

Stock and Stand Table

ASPEN POLETIMBER TYPE

Average Per Acre

DBH Classes 10"	DBH Classes 2"	Number of Trees	Volume Cubic Feet
0	1.0-2.9	142.83	
	3.0-4.9	285.68	
1	5.0-6.9	185.71	450.97
	7.0-8.9	57.14	352.98
	9.0-10.9	25.00	254.33
2	11.0-12.9	9.28	163.50
	13.0-14.9	4.64	105.09
	15.0-16.9	1.79	59.57
	17.0-18.9	1.07	41.22
	19.0-20.9	0.35	18.79
	Total	713.49	1,446.45

Table 25

Average Net Volume Per Acre By Species

ASPEN POLETIMBER TYPE

Species	Average Volume per Acre Cubic Feet	Percent
Lodgepole Pine	278.86	19.28
Subalpine Fir	40.46	2.80
Aspen	1,127.13	77.92
Total	1,446.45	100.00

Table 26

Area and Volume By Volume Stratum
National Forest Commercial Forest Land

Volume Stratum No.	Type	Stand Size Class	Stocking Class	No. of Locations	Area in Volume Stratum (Acres)	Volume Per Acre Int. 1/4" BF	Volume Per Acre Scribner BF	Volume Per Acre Cubic Feet	Total Volume Int. 1/4" MBF	Total Volume Scribner MBF	Total Volume Cu.Ft. MCF
-	Douglas-fir	SST	Med.	0	696	VS 1			5,054	4,169	1,134
1	Douglas-fir	SST	Poor	1	1,895	7,262.13	5,989.25	1,629.33	13,762	11,350	3,088
-	Ponderosa Pine	SST	Med.	0	125	VS 2			170	127	51
2	Ponderosa Pine	SST	Poor	2	1,435	1,363.97	1,018.77	411.14	1,957	1,462	590
-	Lodgepole Pine	LST	Med.	0	40	VS 3			595	494	132
-	Lodgepole Pine	SST	Well	0	483	VS 3			7,190	5,966	1,589
3	Lodgepole Pine	SST	Med.	17	72,162	14,886.57	12,351.21	3,290.89	1,074,245	891,288	237,477
4	Lodgepole Pine	SST	Poor	17	56,216	8,407.31	6,792.67	2,332.11	472,625	381,857	131,102
5	Limber Pine et al	SST	Med.	1	50	9,020.35	6,764.49	2,183.49	451	338	109
6	Limber Pine et al	SST	Poor	1	615	4,623.00	3,737.50	1,050.74	2,843	2,298	646
7	Spruce-Fir	LST	Med.	1	802	48,507.95	42,375.07	8,339.68	38,903	33,985	6,688
8	Spruce-Fir	LST	Poor	1	287	15,607.97	13,740.54	2,941.14	4,479	3,944	844
9	Spruce-Fir	SST	Well	1	310	25,089.22	20,419.58	5,148.76	7,778	6,330	1,596
10	Spruce-Fir	SST	Med.	40	137,495	17,167.28	14,342.31	3,617.70	2,360,415	1,971,996	497,415
11	Spruce-Fir	SST	Poor	16	47,936	6,664.30	5,394.42	1,678.37	319,460	258.587	80,454
Total Sawtimber				98	320,547	13,445.54	11,150.29	3,003.97	4,309,927	3,574,191	962,915
12	Douglas-fir	PT	Well	1	1,710			1,326.00			2,267
13	Douglas-fir	PT	Med.	1	490			1,568.32			768
-	Douglas-fir	PT	Poor	0	77	VS 13					121
-	Ponderosa Pine	PT	Well	0	50	SU 24 - VS 8		496.77			25
-	Ponderosa Pine	PT	Med.	0	1,150		9	539.57			621
-	Ponderosa Pine	PT	Poor	0	635		10	411.35			261
14	Lodgepole Pine	PT	Well	18	85,966			1,851.72			159,185
15	Lodgepole Pine	PT	Med.	28	102,660			1,210.52			124,272
16	Lodgepole Pine	PT	Poor	4	30,524			513.47			15,673
17	Limber Pine et al	PT	Well	1	285			322.61			92
18	Limber Pine et al	PT	Med.	1	2,290			0			--

(Table continued on following page)

Table 26 (Continued)

Volume Stratum No.	Type	Stand Size Class	Stocking Class	No. of Locations	Area in Volume Stratum (Acres)	Volume Per Acre: Int. 1/4" BF	Volume Per Acre: Scribner BF	Volume Per Acre: Cubic Feet	Total Volume: Int. 1/4" MBF	Total Volume: Scribner MBF	Total Volume: Cu.Ft. MCF
19	Limber Pine et al	PT	Poor	1	920			0			--
20	Spruce-Fir	PT	Well	2	3,582			2,544.54			9,802
21	Spruce-Fir	PT	Med.	4	23,305			1,493.36			34,803
22	Spruce-Fir	PT	Poor	3	13,129			1,232.16			16,177
Total Poletimber				64	266,773			1,364.71			364,067
23	Lodgepole Pine	S-S	Well	3	13,283			788.94			10,479
24	Lodgepole Pine	S-S	Med.	2	3,242			189.75			615
25	Lodgepole Pine	S-S	Poor	1	1,593			--			--
-	Limber Pine et al	S-S	Med.	0	45	VS 25					--
-	Limber Pine	S-S	Poor	0	335	VS 25					--
-	Spruce-Fir	S-S	Well		20	VS 27					1
27	Spruce-Fir	S-S	Med.	2	773			54.56			42
28	Spruce-Fir	S-S	Poor	2	1,446			60.03			87
Total Seedling-Saplings				10	20,737			54.12			11,224
-	Ponderosa Pine	NS		0	60						
26	Lodgepole Pine	NS	--	1	1,122						
-	Limber Pine	NS		0	30	VS 26					
29	Spruce-Fir	NS		2	14,856			275.48			4,093
Total Nonstocked				3	16,068			254.72			4,093
35	Dead Spruce			-	3,999			4,324.93			17,295
Total Coniferous Types				175	628,124			2,164.53			1,359,594
30	Aspen	SST	--		245			3,679.80			902
	Aspen	PT	--	7	31,876			1,137.29			36,252
33	Aspen	S-S	--	2	8,174			422.32			3,452
Total Hardwoods				9	40,295			1,007.72			40,606
Grand Total				184	668,419			2,094.79			1,400,200

Table 27

Area and Volume By Volume Stratum and Ownership

Volume Stratum No.	Type	Stand Size Class	Stocking Class	Volume Per Acre: Inter. 1/4" BF	Scribner BF	Cubic Feet	State & County Lands: Area Acres	Total Volume: Int. 1/4" MBF	Scrib MBF	Cu. Ft. MCF	Privately-Owned Lands: Area Acres	Total Volume: Int. 1/4" MBF	Scrib. MBF	Cu. Ft. MCF
1	Douglas-fir	SST	Poor	7,262.13	5,989.25	1,629.33					332	2,411	1,988	541
-	Ponderosa Pine	SST	Med.	USE VS 2			--				55	75	56	23
2	Ponderosa Pine	SST	Poor	1,363.97	1,018.77	411.14	--				797	1,087	812	328
3	Lodgepole Pine	SST	Med.	14,886.57	12,351.21	3,290.89	155	2,307	1,914	510	3,805	56,643	46,996	12,522
4	Lodgepole Pine	SST	Poor	8,407.31	6,792.67	2,332.11	193	1,623	1,311	450	4,595	38,632	31,212	10,716
6	Limber Pine	SST	Poor	4,623.00	3,737.50	1,050.74	--				215	994	804	226
8	Spruce-Fir	LST	Poor	15,607.97	13,740.54	2,941.14	--				10	156	137	29
10	Spruce-Fir	SST	Med.	17,167.28	14,342.31	3,617.70	29	498	416	105	8,748	150,179	125,467	31,648
11	Spruce-Fir	SST	Poor	6,664.30	5,394.42	1,678.37	49	327	264	82	4,183	27,877	22,565	7,021
Total Sawtimber							426	4,755	3,905	1,147	22,740	278,054	230,037	63,054
12	Douglas-fir	PT	Well			1,326.00					215			285
13	Douglas-fir	PT	Med.			1,568.32					31			49
-	Ponderosa Pine	PT	Well			496.77					10			5
-	Ponderosa Pine	PT	Med.			539.57					494			267
-	Ponderosa Pine	PT	Poor			411.35					415			171
14	Lodgepole Pine	PT	Well			1,851.72	128			237	5,219			9,664
15	Lodgepole Pine	PT	Med.			1,210.52	162			196	8,383			10,148
16	Lodgepole Pine	PT	Poor			513.47	18			9	1,958			1,005
18	Limber Pine et al	PT	Med.			0	40			--	476			--
19	Limber Pine	PT	Poor			0	--			--	441			--
20	Spruce-Fir	PT	Well			2,544.54					150			382
21	Spruce-Fir	PT	Med.			1,493.36	35			52	2,377			3,550
22	Spruce-Fir	PT	Poor			1,232.16	10			12	800			986
Total Poletimber							393			506	20,969			26,512

(Table continued on following page)

Table 27 (Continued)

Area and Volume By Volume Stratum and Ownership

Volume Stratum No.	Type	Stand Size Class	Stocking Class	Volume Per Acre: Inter. 1/4" BF	Scribner BF	Cubic Feet	State & County Lands: Area Acres	Total Volume: Int. 1/4" MBF	Scrib MBF	Cu.Ft. MCF	Privately-Owned Lands: Area Acres	Total Volume: Int. 1/4" MBF	Scrib. MBF	Cu. Ft. MCF
23	Lodgepole Pine	S-S	Well			788.94	54			43	556			439
24	Lodgepole Pine	S-S	Med.			189.75	30			6	240			46
25	Lodgepole Pine	S-S	Poor			--					280			--
	Limber Pine	S-S	Med.			--					65			--
	Limber Pine	S-S	Poor			--	5				60			--
27	Spruce-Fir	S-S	Med.			54.56	10			--	100			6
28	Spruce-Fir	S-S	Poor			60.03	25			--	50			3
Total Seedling-Saplings							124			49	1,351			494
	Ponderosa Pine	NS				--				--	20			--
	Lodgepole Pine	NS				--				--	33			--
	Spruce-Fir	NS				275.48	40			11	936			258
Total Nonstocked							40			11	989			258
	Dead Spruce					4,324.93	--			--	60			260
Total Coniferous Types							983			1,713	46,109			27,524
	Aspen	PT				1,137.29					4,144			4,712
	Aspen	S-S				422.32	10			4	1,089			460
Total Hardwoods							10			4	5,233			5,172
Grand Total							993			1,717	51,342			32,696

COMPARTMENT MAP OF THE ARAPAHO WORKING CIRCLE

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE

ARAPAHO NATIONAL FOREST
COLORADO
SIXTH PRINCIPAL MERIDIAN
1954

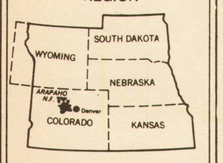
Scale 1 ½ 0 1 2 3 4 5 Miles

Compartments in which cutting will be done in period July 1, 1961 to June 30, 1971

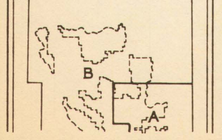
LEGEND

Block Boundary
Compartment Bndry
Timber Access Roads To be constructed.

KEY MAP
ROCKY MOUNTAIN REGION



FOREST SERVICE
MAP CLASSIFICATION AREAS



LEGEND

- National Forest boundary
- Adjacent National Forest boundary
- Highway, hard surface
- Good motor road, graded gravel
- Motorway, improved dirt
- Poor motorway, unimproved dirt.
- Trail
- Railroad
- Telephone line
- Power line
- Fire tool cache
- Supervisor's Headquarters
- District ranger station } Report fires here
- Guard or ranger station (not permanently occupied)
- House, cabin or other building
- Improved forest camp
- Improved picnic ground
- Permanent lookout station
- Triangulation station
- Municipal and other airports
- Wild area (less than 100,000 acres)
- Natural Area
- Schoolhouse

Compiled 1954 at Denver, Colo.
from U.S.G.S.-S.C.S. and F.S. Surveys

Polyconic projection
North American datum

Longitude west from Greenwich